

DOCUMENT RESUME

ED 210 527

CE 030 819

AUTHOR Miller, Donna; Becker, William J.
 TITLE Low Energy Technology. A Unit of Instruction in General Energy Concepts.
 INSTITUTION Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
 PUE DATE 80
 NOTE 39p.; For related documents see CE 030 820-829.
 AVAILABLE FROM Instructional Materials Service, University of Florida, 101 Rofis Hall, Gainesville, FL 32611 (\$1.00).
 EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS Agribusiness; Behavioral Objectives; *Conservation Education; Course Content; Curriculum Guides; Depleted Resources; *Energy; *Energy Conservation; Extension Education; Fuel Consumption; Fuels; High Schools; Instructional Materials; Learning Activities; Learning Modules; *Natural Resources; Postsecondary Education; Teaching Guides; Test Items; Transparencies; Visual Aids
 IDENTIFIERS *Energy Consumption; Energy Conversion; Energy Crisis; Energy Development; Energy Requirements; Florida

ABSTRACT

This unit of instruction on general energy concepts was designed for use by agribusiness and natural resources teachers in Florida high schools and by agricultural extension agents as they work with students and adults. It is one of a series of 11 instructional units (see note) written to help teachers and agents to educate their students and clients about the problems of energy shortages and strategies for energy conservation and management. This unit is organized into three modules: (1) What Is Energy?; (2) Energy Consumption; and (3) Energy Problems and Conflicts. Topics covered in the unit include defining energy; sources of energy; conversion of energy into usable forms; advantages and disadvantages of different sources of energy; most widely used sources of energy; worldwide and Florida energy consumption and sources; and energy problems and solutions. The unit contains student performance objectives, content information, teaching-learning activities, student handouts, transparency masters, and evaluation instruments. (KC)

 * Reproductions supplied by EDRS are the best that can be made *
 * from the original document. *

ED210527

LOW ENERGY TECHNOLOGY
A UNIT OF INSTRUCTION
IN
GENERAL ENERGY CONCEPTS

Developed by

Donna Miller
William J. Becker

Department of Agricultural and Extension Education
Institute of Food and Agricultural Sciences
University of Florida
Gainesville

1980

This public document was promulgated at a cost of \$ 1446.94, or 10 cent
per copy to inform Agribusiness and Natural Resources teachers in Florida
of the products and services of the Instructional Materials Service.

This unit of instruction was developed as a part of the Low Energy Technology Program of the Institute of Food and Agricultural Sciences, University of Florida. Additional copies of this and other units of instruction in Low Energy Technology can be obtained by contacting the Instructional Materials Service, 101 Rolfs Hall, University of Florida, Gainesville, Florida 32611.

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.
☐ Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official NIE
position or policy.

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

Carl E. Beaman

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

CE 030 819

INTRODUCTION

The energy problem has been apparent for several years and even the most ardent skeptics are beginning to recognize that there is an energy problem and that it will continue in the future. As energy sources dwindle, demands increase and prices rise, consumers are faced with difficult decisions regarding their personal consumption of energy and the impact that energy will have on their lives.

In order to cope with these changes, consumers need to be educated as to the problems, causes and alternatives available. How well these problems are solved are determined by how clearly they are recognized. It is very important to present an overview with as little bias as possible to assist the student in making their own choices.

This unit of instruction on General Energy Concepts has been organized into three modules: (1) What is Energy ?; (2) Energy Consumption; and (3) Energy Problems & Conflicts. Each module includes student performance objectives which are divided by modules. After the completion of these modules, the student will be able to:

What is Energy ? (Module 1)

1. Define energy and distinguish between potential and kinetic energy by written definition and give three examples of each.
2. List five primary sources of energy available on earth.
3. Explain how a source of energy is converted to a useable form. Diagram or describe five examples.
4. List one advantage and one disadvantage of each source of energy.
5. Correctly match 20 terms related to energy with their definitions.

Energy Consumption (Module 2)

1. List the three most widely used energy sources.
2. Describe how energy consumption world wide is changing.
3. List two ways in which the State of Florida and its sources differ from the world energy sources.
4. List two ways in which Florida differs from the U.S. in energy consumption.
5. Give five reasons why Florida's consumption of energy differs from the United States pattern of energy consumption.

Energy Problems & Conflicts (Module 3)

1. List and briefly describe six energy problems or conflicts presently facing the American people.
2. List six actions or activities, individuals or groups could take to become part of the movement toward solving our energy conflicts and problems.

This unit of instruction on general energy concepts includes student performance objectives, content information, teaching-learning activities, student handouts, transparency masters and evaluation instruments, use a copy machine to reproduce the student handouts and make the transparencies.

This unit of instruction was designed for use by agribusiness and natural resources teachers in Florida high schools and by agricultural extension agents as they work with their clientel. This unit of instruction was designed by the Department of Agricultural and Extension Education, Institute of Food and Agricultural Sciences as part of their Low Energy Technology Program.

STUDENT PERFORMANCE OBJECTIVES	CONTENT	TEACHING-LEARNING ACTIVITIES
The student will be able to: 1. Define energy and distinguish between potential and kinetic energy by written definition and give three examples of each.	Energy is - light - heat - motion - coal - gasoline - battery - work - power Two classifications of energy - potential - kinetic - stored energy - energy in action Energy Laws - Energy can be neither created or destroyed - In any conversion of energy from one form to another some of it becomes unavailable for future use Five primary sources of energy are <u>solar (Kinetic)</u> - heat - wind - water - photosynthesis <u>chemical (potential)</u> - coal - oil - natural gas <u>geothermal (kinetic)</u> - geysers - hot springs <u>tidal (kinetic)</u> <u>nuclear (potential)</u>	Handout: "A Vocabulary of Energy Words". Students use "A Vocabulary of Energy Words" to define <u>potential</u> and <u>kinetic</u> energy. Divide into small groups and name as many examples of each form as possible. Handout: "What is Energy?" Students check "A Vocabulary of Energy Words" for definitions of each source of energy. Students, individually or in groups, develop oral or written reports on one source of energy. Handout: "Sources of Energy".

UNIT: GENERAL ENERGY

LOW ENERGY TECHNOLOGY
GENERAL ENERGY CONCEPTS

MODULE: WHAT IS ENERGY?

STUDENT PERFORMANCE OBJECTIVES	CONTENT	TEACHING-LEARNING ACTIVITIES
3. Explain how a source of energy is converted to a useable form. Diagram or describe five examples.	The five sources of energy must be converted to one of the following forms in order to be used - Thermal - Mechanical - Electrical	Students consult "A Vocabulary of Energy Words" for definitions of various forms of energy. Have students list as many examples of each form and its uses as possible. i.e. Thermal: open fire to heat to cooking. Use transparency or handout "Energy's Route" and discuss energy's route from source to end use.
4. List one advantage and one disadvantage of each source of energy.	Advantages - Disadvantages to - Solar - Geothermal - Chemical - Nuclear - Tidal	Handout: "Advantages and Disadvantages to Each Source of Energy". Divide students into groups to research advantages and disadvantages of each source of energy. Each group will do an oral report to the class. Draw conclusions regarding the use of each source in Florida.
5. Correctly match 20 terms related to energy with their definitions.	A Vocabulary of Energy Words	Review "A Vocabulary of Energy Words" as a group discussing unfamiliar terms.

UNIT: GENERAL ENERGY

LOW ENERGY TECHNOLOGY
GENERAL ENERGY CONCEPTS

MODULE: WHAT IS ENERGY?

STUDENT PERFORMANCE OBJECTIVES

CONTENT

TEACHING-LEARNING ACTIVITIES

Test students knowledge of energy terms. See Evaluation - Energy Terms.

STUDENT PERFORMANCE OBJECTIVES

CONTENT

TEACHING-LEARNING ACTIVITIES

The student will be able to:

1. List the three most widely used energy sources.

The three most widely used energy sources

- Oil
- Coal
- Natural gas

Other sources

- Solar
- Nuclear
- Water
- Wind
- Tides
- Geothermal

Which energy source(s) are our major concern in the years ahead? Why?

Have students collect newspaper and magazine articles on the energy sources and energy consumption.

2. Describe how energy consumption world wide is changing.

Demand is up and going up world wide. U. S. demand is increasing but not as fast as in some other parts of the world.

Transparency: "World Energy Consumption".

3. List two ways in which the State of Florida and its sources differ from the world energy sources.

Sources of Energy Consumption

<u>Source</u>	<u>World</u>	<u>U. S.</u>	<u>Florida</u>
Oil	46.0%	47.7%	58.0%*
Coal	28.3%*	18.6%*	12.8%*
Natural gas	19.6%	27.3%*	21.0%
Hydroelectric	5.5%	4.1%	- *
Nuclear	2.8%	0.6%	8.2%*

*Major differences

Transparency: "Energy Consumption by Source".

STUDENT PERFORMANCE OBJECTIVES	CONTENT	TEACHING-LEARNING ACTIVITIES												
4. List two ways in which Florida differs from the U.S. in energy consumption.	Differences in Energy Consumption <table> <tr> <th>Consumption</th><th>U.S.</th><th>Florida</th></tr> <tr> <td>Transportation*</td><td>26.3%</td><td>37.5%</td></tr> <tr> <td>Industrial*</td><td>36.0%</td><td>16.0%</td></tr> <tr> <td>Residential/ Commercial*</td><td>37.5%</td><td>46.5%</td></tr> </table> *Major differences	Consumption	U.S.	Florida	Transportation*	26.3%	37.5%	Industrial*	36.0%	16.0%	Residential/ Commercial*	37.5%	46.5%	Transparency: "Total Energy Consumption by Sector, Florida and the United States, 1978".
Consumption	U.S.	Florida												
Transportation*	26.3%	37.5%												
Industrial*	36.0%	16.0%												
Residential/ Commercial*	37.5%	46.5%												
5. Give five reasons why Florida's consumption of energy differs so from the United States pattern of energy consumption.	Reasons for Differences - Tourism state - Limited industry in state - Transportation of agricultural products out of state - Transportation of products into state - Length, geography of the state - High use of energy in Florida agriculture. Low soil fertility, type of crops, need for high fertilizer applications. Climate, heat and humidity, no winter freezes result in high demand for pesticides - Air conditioning	Class Discussion: - Why does Florida use more energy for transportation? - Why does Florida use more energy for agriculture? - Why does Florida use more energy for residential and commercial uses? - Why does Florida use less energy for industrial uses? List reasons on chalkboard.												

STUDENT PERFORMANCE OBJECTIVES	CONTENT	TEACHING-LEARNING ACTIVITIES
The student will be able to: 1. List and briefly describe six energy problems or conflicts presently facing the American people.	International Problems or Conflicts - OPEC control of major oil supplies - Political climate of the Middle East - Growing world - wide demand for oil National Problems or Conflicts - Control of American oil reserves - Use of nuclear power, construction and safety of nuclear power plants - Clean air and use of coal - Transportation - private automobile vs. mass transportation systems - Rail vs. Truck transportation - Rationing vs. high prices - Priorities - Who will get the limited supplies? - Development of alternate energy sources - Gasohol - Solar	Read, collect newspaper and magazine articles on energy problems or conflicts. Develop a bulletin board on energy problems or conflicts. Invite a speaker to class with knowledge of the energy problems and conflicts. Have students select an energy problem or conflict, write a report and/or give oral presentation to class. Develop a chart and graph the increase of energy prices over recent years. Graph gasoline, diesel fuel, coal, electricity prices. Show slide sets or films: - Low Energy Agriculture - The Energy Event - Fuel for Food - Understanding the Energy Problem - Energy Sources of the Future - Have We Stayed Too Long At The Fair?

STUDENT PERFORMANCE OBJECTIVES

CONTENT

TEACHING-LEARNING ACTIVITIES

2. List six actions or activities individuals or groups could take to become part of the movement toward solving our energy conflicts and problems.

Actions-Activities

- Read, listen, be informed
- Vote
- Write congressmen, senators, etc.
- Inform others
- Practice energy conservation
- Promote alternate energy sources

Conduct school or community wide awareness program with displays, programs, radio spots, and/or newspaper articles.

Do home/farm/business energy audits as a club service project.

Conduct a tractor-pulling contest that awards prizes for tractors which pull loads with the most energy efficiency.

HANDOUT

A VOCABULARY OF ENERGY WORDS

Bituminous Coal

- Soft coal, high in volatile matter.

Brownout

- The lowering of power supplied to customers by a power company when power demand exceeds generating capacity.

Calorie

- A unit of heat equal to the amount of heat necessary to raise the temperature of one kilogram of water one degree Celsius; equal to 1000 small calories.

Catalytic Converter

- A device placed on the exhaust of an automobile that changes carbon monoxide and hydrocarbons (which cause air pollution) to carbon dioxide and water.

Celsius

- A temperature scale which runs from zero degrees (the temperature of melting ice) to one hundred degrees (the temperature of boiling water). Sometimes called Centigrade.

Chemical Energy

- Energy stored in the structure of atoms and molecules, which can be released by a chemical reaction.

Coal

- A solid organic material formed by the decomposition of plant material without air, containing 75% carbon.

Coal Gas

- "Fuel gas", the gas formed when coal is partially burned to make coke. Has one-third the energy of natural gas.

Coal Gasification

- The process which converts coal to a gas.

Coal Liquification

- The process which converts coal to a liquid fuel by the addition of hydrogen.

Coke

- A porous, solid residue resulting from the incomplete combustion of coal heated in an oven with a limited supply of air. A good fuel, more nearly pure carbon than coal.

Combustion

- Burning, a chemical reaction producing heat and light and, in some cases, a flame. Usually a combination of carbon and oxygen.

Conduction

- The transmission of energy directly from one substance or molecule to another.

Convection

- The transfer of energy by moving masses of liquid or gasses.

Cooling Tower

- A structure for cooling waste water from power plants.

Crude oil

- A mixture of hydrocarbons in liquid form found in underground reservoirs; the raw material from which most refined petroleum products are made.

Electrical Energy

- A flow of charged particles, usually electrons.

Energy

- Energy is light, heat or motion (Kinetic Energy) or the ability of matter to produce light, heat or motion (Potential Energy). Energy is power or the potential to produce power and power can produce work.

Fahrenheit

- A temperature scale which uses 32 degrees as the melting point of ice and 212 degrees as the boiling point of water, named after its inventor.

First Law of Thermodynamics

- The law of conservation of energy, which states that energy can neither be created nor destroyed.

Fission

- The splitting of atoms (heavy nuclei) to release energy.

Fossil Fuel

- A natural fuel such as coal, oil, or natural gas, formed from the fossil remains of living things.

Geothermal Energy

- Heat energy within the earth which produces steam when it comes in contact with water.

Geyser

- A spring from which hot water and steam shoot into the air.

Hydroelectric Plant

- An electric power plant in which electricity is generated by using the energy of falling water to turn turbines.

Indirect Energy

- Any form of energy used to provide goods and services which themselves may or may not use energy.

Kinetic Energy

- The energy of motion; the ability of an object to do work because of its motion.

Mechanical Energy

- A form of energy which is seen as the motion of an object.

Natural Gas

- A natural mixture of hydrocarbons found in porous rocks under the earth's surface, usually in association with petroleum. It is almost pure methane.

Nuclear Energy

- Atomic energy, the energy released by changes in the nucleus of an atom in a reactor.

OPEC

- The Organization of the Petroleum Exporting Countries. These countries include: Indonesia, Nigeria, Gabon, Venezuela, Iran, Ecuador, Algeria, Libya, Iran, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates.

Potential Energy

- Energy in its natural form, such as coal or oil, before its conversion to end-use forms of energy, such as heat or electricity.

Radiation

- The emission of energy through matter or space.

Reserves

- Portions of a resource such as oil which have been discovered and can be extracted by available technology.

Second Law of Thermodynamics

- In any energy conversion, some energy passed from a useful to a less useful form, usually lost heat or "heat tax".

Uranium

- A radioactive, metallic element used as a fuel in nuclear power plant reactors to generate electricity.

Volt

- The electromotive force which will cause a current of one ampere to flow through a resistance of one ohm.

Watt

- A metric unit of power used in electric measurements of the rate at which work is done or energy used. One watt equals one Joule of work per second.

HANDOUT

WHAT IS ENERGY?

Energy has always been a part of our everyday lives but it was taken for granted by most of us until a few years ago. In the mid-1970's the "Energy Crisis" brought to our attention the role that energy plays in our lives. Radio, television, magazines and newspapers now carry advertisements and articles bringing to our attention our waste of energy or our use of dwindling supplies. We now recognize energy in its various forms such as heat from an oil powered furnace, the electricity that produces light, the gasoline that powers our automobile engines and the food we eat which fuels our bodies. All of these, plus many more forms, are examples of energy we see or use every day.

Because there are so many examples of energy, we must organize them into categories in order to understand them. There are two forms of energy. The first is kinetic energy. It is energy on the move, which is the form it must be in for us to use it. It is energy that is movement, heat, or light. The wood burning in a fireplace and giving off heat and light are examples of kinetic energy.

The second form energy takes is as stored energy, called potential energy. Gasoline, wood or the uranium used to produce nuclear energy are all examples of potential energy. Potential energy must change in form to kinetic energy in order to be used.

The changes of form that energy must go through are controlled by strict laws called by a fancy name, the Laws of Thermodynamics. The first one states that energy can be neither created nor destroyed. This means that once you have a certain amount of energy it can change forms or be stored but it still remains as that amount of energy. For instance, 200 calories you get from eating a candy bar may become heat energy in your body to power your muscles or it may be stored as fat

but it is still 200 calories of energy. This sounds like good news, right?

The second law explains the bad news.

The second law states in any conversion of energy from one form to another some of it becomes unavailable for further use. This happens because it becomes heat and it is impossible to change a given amount of heat energy back to another form.

Heat energy is different from other forms of energy. It is possible to change all forms of energy to heat but only a small amount of heat energy can be changed back to other forms. For instance, the chemical energy of gas is changed to heat in order to warm our homes but that heat is not changed back to another form. It is lost for future use. You can convert chemical energy to mechanical energy in a car but you can not change the energy used, back to gasoline again.

HANDOUT

SOURCES OF ENERGY

Where we get our energy has become a big issue in the "Energy Crisis" and all of us have been made aware of the most used source of energy - fossil fuels - coal, oil and gas. But, there are other sources of the energy we use every day. Many people are becoming more aware of the sources as scientists have tried to develop new ways to use them.

The sun is our most obvious source of energy. Daily it beams in a fresh supply of radiant energy to replenish the earth's supplies. Solar energy from the sun is kinetic energy; thus, it must be used immediately or changed to another form in order for it to be stored.

One of the most obvious ways in which we use solar energy is the warmth we get from its rays on a cool day. It also warms the land and the oceans and the air in the same way.

As the air is heated by the sun and its warm currents come in contact with cooler currents, wind is created. In many places of the world, wind is used to turn windmills which operate generators, which create electricity to light homes or farms.

The heat from the sun also causes moisture to evaporate from the surface of the earth. As it rises to the cooler part of the atmosphere, it condenses and becomes water which falls back to the land as rain. This water then becomes part of the streams and rivers whose power may be used to turn turbines to generate electricity.

Another way in which solar energy is used is through chemical interactions. The sun's rays cause a chemical reaction in growing plants. This reaction is called photosynthesis and is the source of our food energy. It is also photosynthesis that created the stores of fossil fuels millions of years ago. It was the decay of plant and animal

life at that time that created the fuels we are rapidly using up today.

Chemical energy is potential energy in the form of fossil fuels. These fuels were begun approximately 300 million years ago when the plants and animals of the swamps died and were buried by changes in the earth. The transformations that occurred, formed the oil, natural gas, and coal that we use for fuel today.

Nuclear energy is a source of great debate today. Nuclear energy is the result of reactions taking place in certain minerals. These minerals are also stored within the earth. The mineral most commonly used to create the nuclear reaction is uranium, but plutonium is another source.

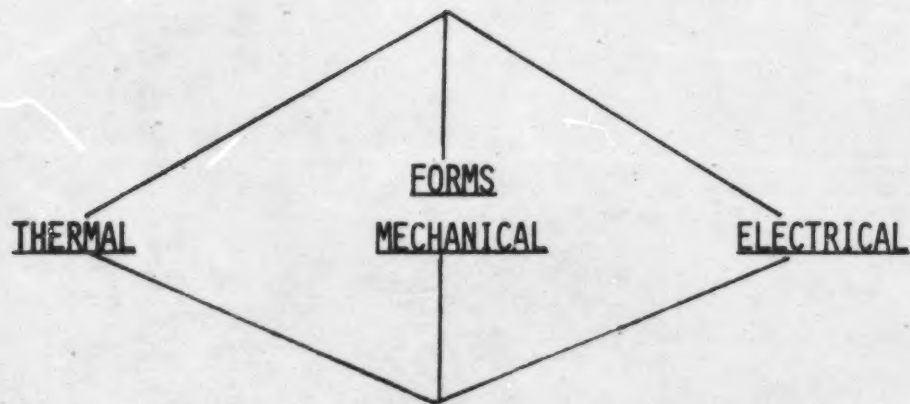
Another source of energy also involves the earth's interior. It is called geothermal energy and is created by the molten rock deep within the earth, thus it is stored kinetic energy. The heat generated there is the reason we have volcanoes, geysers, and hot springs. In most areas of the country this heat is not close enough to the surface to do any good but in areas where there are geysers, they can be used. The steam from the geysers is harnessed to drive turbines which generate electricity.

The final source of energy is tidal energy. The tides created by the rotation of the earth and moon are a form of stored kinetic energy. The technology to use this source of energy has not yet been developed and most scientists think that tidal energy has only limited potential.

ENERGY'S ROUTE

SOURCE

SOLAR
CHEMICAL
GEOTHERMAL
TIDAL
NUCLEAR



PICTURE
TO
DEPICT

{ RUN CARS, TRUCKS, ETC.
COOK
LIGHT HOMES & OTHER BUILDINGS

HANDOUT

Advantages and Disadvantages to Each Source of Energy

Advantages

Solar

1. Available to everyone.
2. Unlimited supply.
3. No pollution.

Geothermal

1. A clean source of energy.
2. Could be utilized with little expense and time as compared to other alternatives.

Chemical

1. Most commonly used source today so most technology is adapted to it.
2. Would be expensive to convert from this form.

Nuclear

1. Breeder Reactors actually produce additional fuel as it produces heat.
2. Use far less fuel to produce same amount of heat.
3. No pollution, if system operates properly.

Tidal

1. Unlimited Supply

Disadvantages

1. Cost of developing technologies to utilize this source on a commercial basis is great.

1. Water pollution can result from briny waste.
2. Land subsidence can be caused by withdrawal of subsurface water.

1. Air pollution from refining and use.
2. Reserves are being depleted.
3. Increased dependence on foreign supplies.

1. Possibility of harmful radiation escaping.
2. High cost of development.
3. Large amounts of plutonium could lead to spread of nuclear weapons.

1. Not commercially feasible.
2. Only possible where rare geologic peculiarities exist.

EVALUATION - ENERGY TERMS

Matching: Match the energy related terms in the right column to the definitions in the left column.

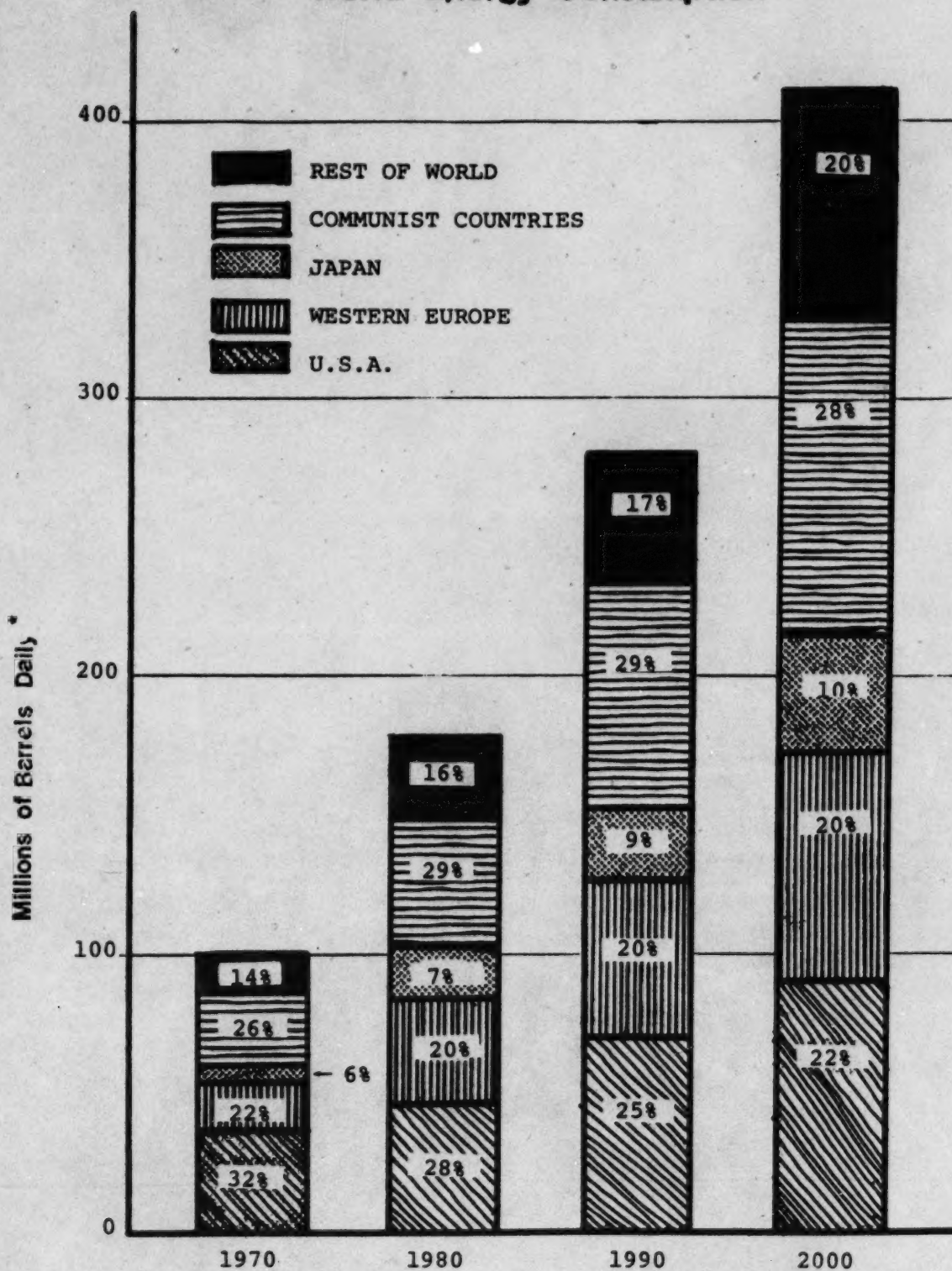
<u>Definitions</u>	<u>Terms</u>
_____ 1. The energy of motion; the ability of an object to do work because of its motion.	A. Calorie
_____ 2. Burning, a chemical reaction producing heat and light and, in some cases, a flame.	B. Chemical Energy
_____ 3. A natural mixture of hydrocarbons found in porous rocks under the earth's surface.	C. Coal
_____ 4. A solid organic material formed by the decomposition of plant material without air, containing 75% carbon.	D. Coal Gas
_____ 5. A natural fuel such as coal, oil, or natural gas, formed from the fossil remains of living things.	E. Coke
_____ 6. A porous, solid residue resulting from the incomplete combustion of coal heated in an oven with a limited supply of air.	F. Combustion
_____ 7. Energy in its natural form such as coal or oil, before its conversion to end-use forms of energy.	G. Conduction
_____ 8. The transfer of energy by moving masses of liquid or gases.	H. Convection
_____ 9. The energy released by changes in the nucleus of an atom in a reactor.	I. Crude Oil
_____ 10. Energy stored in the structure of atoms and molecules, which can be released by a chemical reaction.	J. Electrical Energy
_____ 11. The transmission of energy directly from one substance or molecule to another.	K. Fossil Fuel
_____ 12. A form of energy which is seen as the motion of an object.	L. Geothermal Energy
_____ 13. Heat energy within the earth which produces steam when it comes in contact with water.	M. Kinetic Energy
_____ 14. "Fuel gas", the gas formed when coal is partially burned to make coke.	N. Mechanical Energy
	O. Natural Gas
	P. Nuclear Energy
	Q. OPEC
	R. Potential Energy
	S. Primary
	T. Radiation

- _____ 15. The raw material from which most refined petroleum products are made.
- _____ 16. The Organization of the Petroleum Exporting Countries.
- _____ 17. A flow of charged particles, usually electrons.
- _____ 18. A unit of heat equal to the amount of heat necessary to raise the temperature of one kilogram of water one degree Celsius; equal to 1000 small calories.
- _____ 19. The emission of energy through matter or space.
- _____ 20. Stored energy as in a battery or water behind a dam.

ANSWER KEY

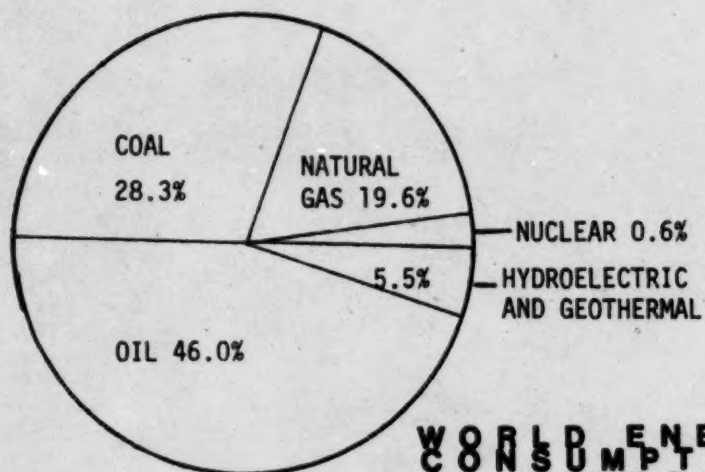
- 1. - M
- 2. - F
- 3. - O
- 4. - C
- 5. - K
- 6. - E
- 7. - S
- 8. - H
- 9. - P
- 10. - B
- 11. - G
- 12. - N
- 13. - L
- 14. - D
- 15. - I
- 16. - Q
- 17. - J
- 18. - A
- 19. - T
- 20. - R

World Energy Consumption



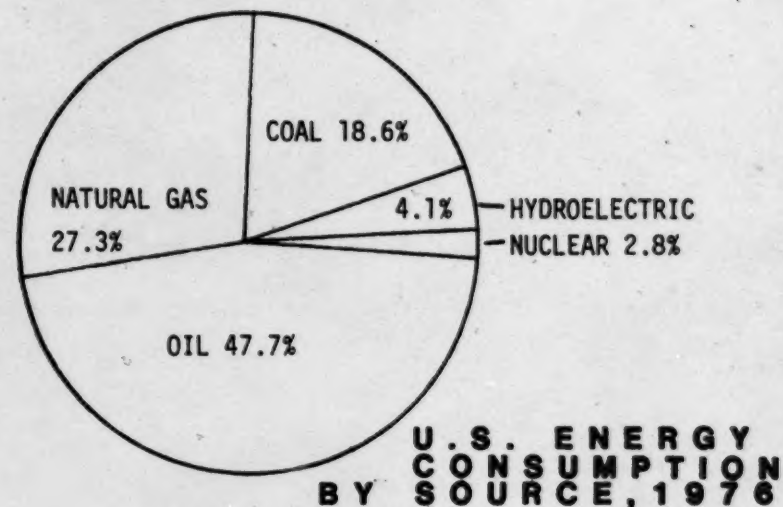
*All sources of energy expressed as equivalent to crude oil.

ENERGY CONSUMPTION BY SOURCE

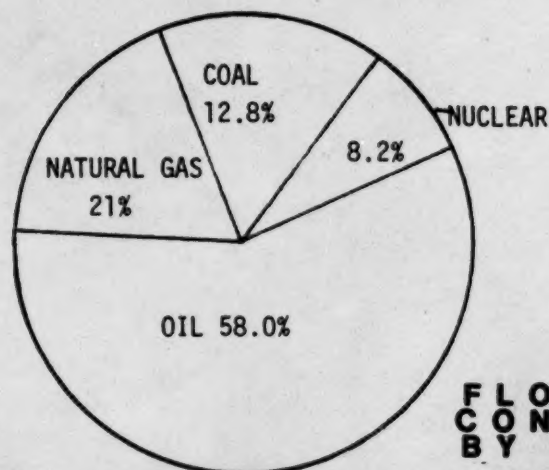


**WORLD ENERGY
CONSUMPTION
BY SOURCE, 1977**

21



**U.S. ENERGY
CONSUMPTION
BY SOURCE, 1976**

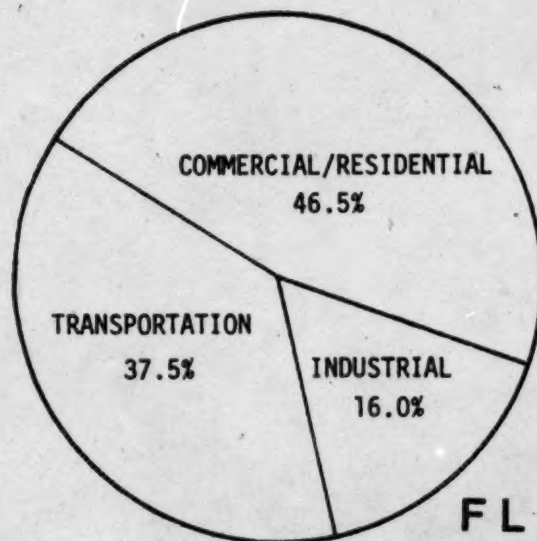


**FLORIDA ENERGY
CONSUMPTION
BY SOURCE, 1976**

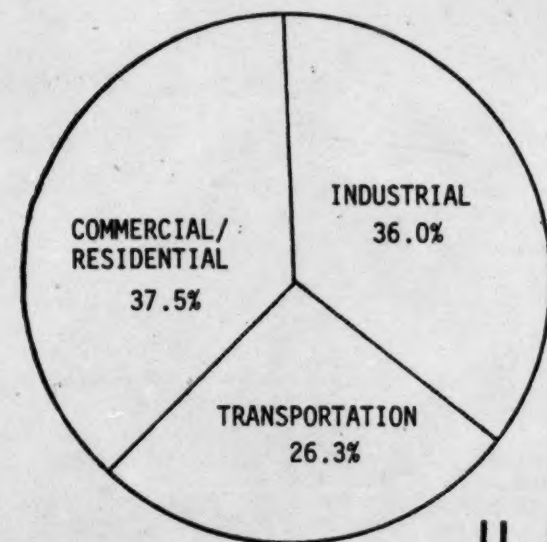
35

36

TOTAL ENERGY CONSUMPTION
BY SECTOR, FLORIDA AND
THE UNITED STATES, 1978



FLORIDA



U.S.

REFERENCES

1. Concern, Inc.
2233 Wisconsin Ave., N.W.
Washington, D.C. 20007
Brochures on each source of energy. Opposed to the use of nuclear energy.
2. National Science Teachers Assoc.
1742 Connecticut Ave., N. W.
Washington, D.C. 20009
Energy-Environment Source Book
Good information source for teacher reference. Parts are also good for students.
3. Factsheets - 19 different titles. Obtain from:

DOE Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

Reprints of materials developed by the National Science Teachers Association through the U.S. Department of Energy. Especially good is the series, an "Alternative Energy Source".
4. U.S. Department of Energy
(same address as above)
Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. Various units but especially of note are the following:
 - Energy Transitions in U.S. History (Grades 8, 9)
 - Energy in the Global Marketplace (Grades 9, 10, 11)
 - Agriculture, Energy and Society (Grades 10, 11, 12)
5. Slide Sets and Films on Energy.
 - Low Energy Agriculture - 80 slides/cassette IFAS or IMS
 - The Energy Event - 80 slides/cassette, IMS
 - Fuel for Food - 94 slides/cassette, IMS
 - Understanding the Energy Problem - 101 slides, IFAS
 - Energy Sources of the Future - Film, 15 minutes, IFAS
 - Have We Stayed Too Long at the Fair? - Film, 25 minutes, IFAS

Order the above audio visuals from:

Instructional Materials Services
101 Rolfs Hall
University of Florida
Gainesville, Florida 32611
(904) 392-0502

IFAS
Building 116
University of Florida
Gainesville, Fl. 32611
(904) 392-0502